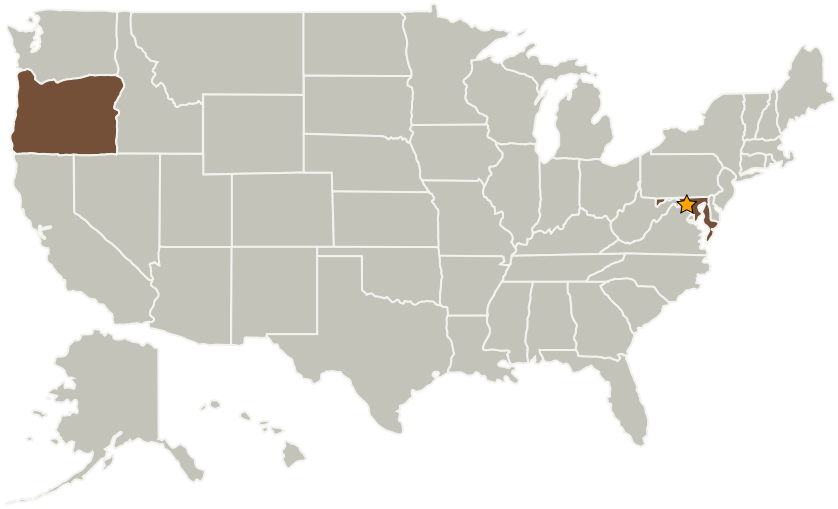
Ultra Compact, Low Power, NIR, Flash LADAR Receiver, Phase I

Completed Technology Project (2006 - 2006)

Project Introduction

The object of this effort is to design a miniature, low power, angle-angle-range, 3-D flash LADAR receiver that can be implemented using germanium-on-insulator/silicon-on-insulator (GOI/SOI) hybrid wafer stacks. The germanium layer of the wafer stack will be used for photodetection functions, so as to take advantage of its excellent photoabsorption in the visible and NIR, as well as its high carrier mobilities. Low-noise, high-bandwidth amplification and pulse detection circuits will be fabricated in the silicon layer of the wafer stack, using mature complementary metal-oxide-semiconductor (CMOS) technology. The proposed design is optimized to be both low power and radiation tolerance. The SOI architecture is inherently tolerant of radiation, as the small volumes of device material involved have a correspondingly smaller scattering cross section. Moreover, isolation of the thin device layer from the substrate means that CMOS receiver circuits fabricated on such a wafer will benefit from increased speed, reduced power consumption, and lower noise. Finally, as the proposed design can be manufactured using commercial CMOS foundry lines, no additional cost, development time, or quality control measures relative to a standard CMOS process will be incurred, once the hybrid wafers are procured. In Phase I, the proposed receiver will be designed, simulated, and optimized using TCAD tools. The design and simulation tasks will be complemented with a short-loop fabrication experiment in which critical receiver components will be fabricated from hybrid GOI/SOI wafer prototypes and characterized.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Voxtel, Inc.	Supporting Organization	Industry	Beaverton, Oregon

Primary U.S. Work Locations	
Maryland	Oregon

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves